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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,032	02/17/2004	Don M. Tucker	P 0532.13015	2818
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BIRDWELL & JANKE, LLP 1100 SW SIXTH AVENUE SUITE 1400 PORTLAND, OR 97204			EXAMINER ABRAHAM, SALIEU M	
			ART UNIT 3709	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/781,032

Applicant(s)

TUCKER, DON M.

Examiner

Salieu M. Abraham

Art Unit

3709

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "32a" and "**32b**" as cited for figure 3 in the specification have both been used to designate reference marks 34a and 34b on figure 3. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. Figure 5 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the

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applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. The claims are objected to as being replete with language such as "a plurality of spaced apart body sensors distributed **outside the body**", which can be interpreted to include the human body as part of the claimed invention apparatus. Applicant is advised to modify this language. For example, "a plurality of spaced apart body sensors configured to be distributed **outside of the body**", is a satisfactory alternative. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 13-19, 23-25, and 32-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's prior art admission (AAPA; see figure 1 and specification, page 3 lines 1-22, page 4 lines 1-22, and page 5 lines 1-4) in view of US Pat. No. 6,330,470 B1 to Tucker (Tucker).

In Reference to Claim 1 and 23

AAPA teaches:

I. An apparatus for increasing the proportion of a responsive signal relative to environmental noise in a system for measuring electromagnetic activity generated by one or more sources inside a living body, comprising:

a) a plurality of spaced apart body sensors distributed outside the body proximate the one or more sources for sensing the electromagnetic activity, said body sensors being primarily responsive to magnetic fields and producing respective body sensor outputs; (see figure 1, reference mark 20)

c) a shield disposed between said body and said first reference sensors for shielding said first reference sensors from the electromagnetic activity; (see figure 1, reference marks 10 and 18)

and

d) an analyzing module for determining portions of said body sensor outputs that covary with corresponding portions of said first reference sensor outputs and subtracting said portions of said body sensor outputs from the respective said body sensor outputs. (see figure 1, reference mark 21)

However, AAPA is silent regarding the "electric field" language in the following:

b) a plurality of spaced apart first reference sensors distributed outside the body corresponding to said body sensors for sensing the environmental noise, said first reference sensors being primarily responsive to **electric fields** and producing respective first reference sensor outputs;

Tucker teaches of a head sensor positioning network and method employing sensors (may be electrical devices functioning as sensors as well). The sensors may be used to sense either electric fields (accompany a voltage/voltage difference) or current (flow) (see the figure, and abstract) for bioelectrical measurements, and particularly improving localization of electrical activity in the body. (see column 1, lines 1-20 and column 2, lines 19-24). In an earlier embodiment of this invention (see incorporated by reference US Pat 5291,888 to Tucker), the sensors used in the head sensor positioning network were used exclusively for the measurement of electric fields in EEG studies (see column 1, lines 7-10, column 3, lines 42-47 and column 4, lines 49-60). One of ordinary skill in the art would further appreciate that sensors for making such measurements show no structural distinction between for those measuring signal and those for measuring noise.

Therefore, it would also have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the electric field sensor of Tucker in place of the reference sensor of AAPA in order to be able to make bioelectric measurements with reduced localization errors from sources in the body as explicitly taught by Tucker (see column 2, lines 14-23).

The method of claim 23 parallels claim 1: that is the process of using the apparatus includes or encompasses the method. Therefore, claim 23 is rejected by AAPA in view of Tucker as well.

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In Reference to Claims 2 and 24

AAPA in view of Tucker has been shown to teach all claim 1 and claim 23 limitations. AAPA in view of Tucker also teaches "wherein said body sensors include SQUIDs further comprising a chamber adapted to contain said SQUIDs immersed in a super-cooling fluid. (see figure 1 and specification, page 4, lines 6-10).

The method of claim 24 parallels claim 2: that is the process of using the apparatus includes or encompasses the method. Therefore, claim 24 is rejected by AAPA in view of Tucker as well.

In Reference to Claims 3 and 25

AAPA in view of Tucker has been shown to teach all claim 2 and 24 limitations.

AAPA in view of Tucker also teaches "wherein said chamber is adapted to maintain said shield at a super-conducting temperature at the temperature of said fluid." (see, specification, page 4, lines 8-10).

The method of claim 25 parallels claim 3: that is the process of using the apparatus includes or encompasses the method. Therefore, claim 25 is rejected by AAPA in view of Tucker as well.

In Reference to Claim 13

AAPA in view of Tucker has been shown to teach the applicant's embodiment wherein the body and reference sensors are both responsive to magnetic fields

(see claim 1).

Tucker further teaches that the body sensor may be an electrode, which is responsive to current flow (see column 3, lines 41-51).

Therefore, it would also have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the electrode body sensor of Tucker in place of the body sensor of AAPA in order to be able to make bioelectric measurements with reduced localization errors from sources in the body as explicitly taught by Tucker (see column 2, lines 14-23).

Therefore, AAPA in view of Tucker further teaches all claim 13 limitations when the magnetic field sensor in the apparatus of claim 1 is replaced with an electrode, current flow sensor as specified above.

In Reference to Claims 14 and 32

AAPA in view of Tucker has been shown to teach all claim 1 limitations. AAPA further teaches the apparatus of claim 1 that cites a super-conducting shield (SS) apparatus extracting noise from measurements of electrical activity within the body (see figure 1) and which is comprised of both magnetic field responsive body and SQUID reference sensors immersed in a chamber adapted to contain SQUIDs immersed in super-cooling fluid (see page 4 of specification, lines 3-15).

The method of claim 32 parallels claim 14. Therefore, claim 32 is rejected by AAPA in view of Tucker as well.

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Note: Claim 14 was best interpreted by examiner to depend on claim 6 as claimed by applicant. However, clarification in applicant's response is requested as to whether claim 14 should depend from claim 6 as is currently cited in the application or claim 13 which is the independent claim immediately preceding it.

In Reference to Claims 15, 33 and 34

AAPA further teaches "wherein said chamber is adapted to maintain said shield at a super-conducting temperature at the temperature of said fluid." (see specification, page 4, lines 5 to 15)

The methods of claims 33 and 34 parallels claim 15. Therefore, claims 33 and 34 are rejected by AAPA in view of Tucker as well.

In Reference to Claims 16-19 and 35-39

Applicant's prior art admission has been shown to teach all claim 14 and 15 limitations. Furthermore, applicant's prior art admission in view of Tucker has been shown to teach all claim 13 limitations and that electrodes may constitute the body sensor. However, applicant's prior art admission in view of Tucker fails to teach an apparatus "further comprising a sensor net adapted to connect each of said electrodes to at least two others of said electrodes by means of respective flexible members" (claims 16 and 35) and " wherein said sensor net is adapted to fix the relative positions of said electrodes, where each of said flexible members is under the same amount of tension, in a geodesic pattern" (claims 17-

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19 and 36-39).

Tucker further teaches of a "geodesic sensor net" that "places a sensor at the vertices of geodesic triangles by elastic lines connecting the sensors in a mutually-balanced tension network" (see column 2, lines 57-59 and reference marks 12 and 20 in the figure) in order to provide an improved method for localizing electrical activity in the body" (see column 2, lines 19-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included the sensor net of Tucker in the apparatus of the applicant's prior art in order to further and improve the measurement of electrical activity within the body as explicitly taught by Tucker (see column 1, lines 53-55).

6. Claims 4-6 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of US Pat. No. 6,330,470 B1 to Tucker (Tucker) further in view of US Pat. No. 4,819,648 to Ko (Ko).

In Reference to Claim 4 and 26

AAPA in view of Tucker has been shown to teach all claim 3 and 23 limitations. However, AAPA in view of Tucker fails to teach "wherein said first reference sensors include coils."

Ko teaches using a "non-invasive electromagnetic technique for monitoring time-trends of physiological changes at a particular location in the brain" (see title and

abstract). The technique employs a method and apparatus which use coils which aid in sensing and more specifically localizing bioelectric activity (i.e. impedance measurements) within the brain (see figure 2, reference mark 10, figure 2, reference marks 40 and 42). The sensor coils as referred to by Ko, are responsive to electric fields as well (see column 5, lines 15-19).

Therefore, it would also have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the coil electric field sensor of Ko in place of the first reference sensor of AAPA in view of Tucker in order to be able to make bioelectric measurements over time with improved spatial localization in the body as explicitly taught by Ko (see column 3, lines 1-2 and 61-65).

The method of claim 26 parallels claim 4. Therefore, claim 26 is rejected by AAPA in view of Tucker further in view of Ko as well.

In Reference to Claim 5

AAPA in view of Tucker has been shown to teach all claim 2 limitations.

However, AAPA in view of Tucker fails to teach "wherein said first reference sensors include coils."

For the reasons cited in claim 4, AAPA in view of Tucker further in view of Ko, further teaches all the claim 5 limitations (see claim 4 rejection).

In Reference to Claim 6

AAPA in view of Tucker (has been shown to teach all claim 1 limitations.

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However, AAPA in view of Tucker fails to teach "wherein said first reference sensors include coils."

For the reasons cited in claim 4, AAPA in view of Tucker further in view of Ko, further teaches all the claim 6 limitations (see claim 4 rejection).

7. Claim 20-22 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of US Pat. No. 4,819,648 to Ko (Ko) further in view of US Pat. No. 6,330,470 to Tucker (Tucker).

In Reference to Claims 20 and 40

AAPA has been shown to teach the embodiment for a superconducting shield (SS) which is comprised of body and reference sensors primarily responsive to magnetic fields. However, AAPA does not address body and reference sensors primarily responsive to current flow and electric fields.

Earlier rejections in this action (see claims 4 and 13 rejections) have explained obvious sensor variants for both sensors primarily responsive to current flow (see claim 4 rejection based on invention to Ko) and electric fields (see claim 13 rejection based on invention to Tucker) which can be used as body or reference sensors.

Therefore, it would also have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the coil sensor of Ko in the apparatus of applicant's prior art as a replacement body sensor primarily

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responsive to current flow for the reasons cited earlier (i.e. improved bioelectric measurement by improving the spatial resolution of acquired data; see column 3, lines 1 and 2). It would have been further obvious to have substituted the electrode sensor of Tucker for the body reference sensor of the applicant's prior art admission in view of Ko apparatus in order to improve accuracy of bioelectrical measurements as taught by Tucker (see column 1, lines 48-55).

The method of claim 40 parallels claim 20. Therefore, claim 40 is rejected by AAPA in view of Ko further in view of Tucker as well.

In Reference to Claims 21 and 41

AAPA in view of Ko further in view of Tucker has been shown to teach all the limitations of claims 20 and 40. Tucker has also been shown to teach of a "geodesic sensor net" that "places a sensor at the vertices of geodesic triangles by elastic lines connecting the sensors in a mutually-balanced tension network" (see column 2, lines 57-59 and reference marks 12 and 20 in figure) in order to provide an improved method for localizing electrical activity in the body" (see column 2, lines 19-21).

Therefore, it would also have been obvious to one of ordinary skill in the art at the time of the invention to have included the sensor net of Tucker in the apparatus of the applicant's prior art in order to further and improve the measurement of electrical activity within the body as explicitly taught by Tucker (see column 1, lines 53-55).

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The method of claim 41 parallels claim 21. Therefore, claim 41 is rejected by AAPA in view of Ko further in view of Tucker as well.

In Reference to Claims 22 and 42

AAPA in view of Ko further in view of Tucker has been shown to teach all the limitations of claims 21 and 41. Tucker has also been shown to teach that the geodesic sensor net has elastic lines connecting the sensors in a mutually-balanced tension network" (see column 2, lines 57-59 and reference marks 12 and 20 in figure). Therefore, AAPA in view of Ko further in view of Tucker teaches all claim 22 and 42 limitations.

The method of claim 42 parallels claim 22. Therefore, claim 42 is rejected by AAPA in view of Ko further in view of Tucker as well.

8. Claims 7-12 and 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of US Pat. No. 4,819,648 to Ko (Ko) further in view of US Pat. No. 4,912,767 to Chang (Chang).

In Reference to Claims 7 and 27

AAPA in view of Ko has been shown to teach all embodiments encompassing body and reference sensors primarily responsive to magnetic fields only (e.g. SQUID-based for both sensor types, see prior art figure 1 or combination of SQUID body and coiled wire reference, see figure 2). However, applicant's prior

art admission in view Ko fails to teach adding a second set of reference sensors (SQUIDs in this case) for noise extraction within the body.

Chang teaches a system and method to solve an identical problem: e.g. an apparatus for increasing the proportion of a responsive signal relative to environmental noise generated by one or more sources (see abstract). The technique described by Chang addresses noise cancellation from a target signal source or primary sensor (see abstract), by eliminating or at least substantially reducing covarying noise components in both the source and a secondary, noise (signal) only, detection sensor (see column 3, lines 3-19 and 52-64). Chang further teaches that systems have been used which employ a primary source sensor and two reference sensors in order to effect noise cancellation from the source signal of interest (see column 3, lines 14-19).

Therefore, it would also have been obvious to one of ordinary skill in the art at the time of the invention to have included the dual reference sensor methodology and apparatus of Chang in the apparatus of the applicant's prior art in view of Ko in order to cancel the unwanted environmental noise signal and leave only the desired bioelectric signal as explicitly taught by Chang (see abstract column 1, lines 53-55, and column 3 lines 3-19).

The method of claim 27 parallels claim 7. Therefore, claim 27 is rejected by AAPA in view of Ko further in view of Chang as well.

In Reference to Claims 8 - 9 and 28 - 29

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AAPA in view of Ko further in view of Chang has already been shown to teach all claim 7 and 27 limitations. In addition, applicant's prior art has been shown to teach that SQUIDs may be used for body and reference sensors with chambers adapted to contain respective SQUIDs immersed in a super-cooling fluid (see claim 2 rejection) and wherein the chamber maintains the SS at a super-conducting temperature at the temperature of said fluid (see claim 3 rejection). Therefore, applicant's prior art in view of Ko further in view of Chang teaches all claim limitations.

The method of claim 28 parallels claim 8, and claim 29 parallels claim 9.

Therefore, claims 28 and 29 are rejected by AAPA in view of Ko further in view of Chang as well.

In Reference to Claims 10-12 and 30

All limitations of claims 7-9 and 27-29 have been taught by applicant's prior art in view of Ko further in view of Chang. Ko further has been shown to teach the limitation wherein the first reference sensors include coiled wire (see claim 4 rejection). Therefore, applicant's prior art in view of Ko further in view of Chang teaches all claim 10-12 limitations.

The method of claim 30 parallels claim 10. Therefore, claim 30 is rejected by AAPA in view of Ko further in view of Chang as well.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to

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applicant's disclosure. Abraham-Fuchs et al., Chang, Clough et al., Gevins et al., He, Ko, Laribiere, Smith et al., Tucker, Van Veen et al. and Williams, have been included because they respectively encompass systems and methods which find utility in bioelectric activity localization and/or which employ electromagnetic and/or current flow sensor apparatus and techniques similar to those described by the applicant for the proposed invention.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Salieu M. Abraham whose telephone number is (571) 270-1990. The examiner can normally be reached on Monday through Thursday 8:30 am - 6:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Bomberg can be reached on (571) 272-4922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

6/16/07

SA

A handwritten signature in black ink, consisting of a stylized 'T' followed by a horizontal line and a vertical line intersecting it.

THAO X. LE
PRIMARY PATENT EXAMINER